TECHNICAL BULLETIN

DIELECTRIC CONNECTIONS

SUBJECT: FIP Swivel Water Heater Connectors as a Dielectric Fitting
DATE: August 2017
PAGE: 1 of 2

The FIP swivel nut connection on Sioux Chief water heater connectors is considered to be a dielectric connection. The gasketed connection provides a dielectric waterway that prevents the process of electrolysis from developing and corroding the pipe and fitting.

Electrolysis is the reaction that takes place between dissimilar metals in the presence of an aqueous solution (water), which results in corrosion of the pipe or fitting. The electric current needed in this process is produced simply by the flow of water, and sometimes aided by stray current coming from ground wires attached to the piping system.

The important fact to point out is that electrolysis only takes place on the inside of the pipe, in the presence of the aqueous solution (water). The electric current travels through the metal pipe and fittings without changing the metal chemically, as it would through a power line. In contrast, the movement of an electric charge through water causes significant chemical changes.

Thus, the ideal connection for dissimilar metals in water line is one that provides a continuous external path or circuit for the current to flow … but interrupts the current along the inside of the fitting where the dissimilar metals join.

In the case of the Sioux Chief FIP swivel nut connection, you will see this exact ideal situation. In a common water heater application, the two dissimilar metals that are in direct contact are the galvanized pipe nipple and the brass nut. Yet their connection is a dry connection. They do not come together in the presence of water. In fact, the brass nut never touches the water at all. The water seal is provided by the EPDM gasket compressed into the rim of the pipe nipple.

The EPDM gasket also acts as an insulator between the dissimilar pipe nipple and the copper tube connector, preventing the current from flowing along the inside wall of the fitting and nipple, in the presence of water. The galvanized material of the pipe nipple cannot react with the brass because they lack the aqueous solution to complete the process. Also, the pipe nipple cannot react with the copper because they are insulated from each other by the EPDM gasket.

Incidentally, an insulator or washer between the brass nut and copper tube connector is not only unnecessary … it can actually be counterproductive. This extra insulator interrupts the external path or circuit, and in some cases, may force the current to short circuit through the water, jumping from the pipe nipple, across the EPDM gasket, to the copper connector. This situation would most likely result in internal electrolytic corrosion of the pipe nipple.

The 2012 International Pluming Code supports the use of a brass nut and a gasket as a dielectric fitting per 605.24 Joints between different materials:

605.24 Joints between different materials. Joints between different piping materials shall be made with a mechanical joint of the compression or mechanical-sealing type, or as permitted in Sections 605.24.1,605.24.2 and 605,24.3. Connectors or adapters shall have an elastomeric seal conforming to ASTM D 1869 or ASTM F 477. Joints shall be installed in accordance with the manufacturer's instructions.

605.24.1 Copper or copper-alloy tubing to galvanized steel pipe. Joints between copper or copper-alloy tubing and galvanized steel pipe shall be made with a brass ñtting or dielectric fitting or a dielectric union conforming to ASSE 1079. The copper tubing shall be soldered to the fìtting in an approved manner, and the fitting shall be screwed to the threaded pipe.

The 2012 International Plumbing Code also supports the use of a brass nut and a gasket as a dielectric fitting per P2905.17 Joints between different materials:

TECHNICAL BULLETIN

DIELECTRIC CONNECTIONS

SUBJECT: FIP Swivel Water Heater Connectors as a Dielectric Fitting
DATE: August 2017

P2905.17 Joints between different materials. Joints between different piping materials shall be made in accordance with Sections P2905.17.1, P2905.17.2 and P2905.17.3 or with a mechanical joint of the compression or mechanical sealing type having an elastomeric seal conforming to ASTM D 1869 or ASTM F 477. Joints shall be installed in accordance with the manufacturer's instructions.

P2905.17.1 Copper or copper-alloy tubing to galvanized steel pipe. Joints between copper or copper-alloy tubing and galvanized steel pipe shall be made with a brass fitting or dielectric fitting. The copper tubing shall be joined to the fitting in an approved manner, and the fitting shall be screwed to the threaded pipe.

In conclusion, the Sioux Chief FIP Swivel Connection provides the ideal dielectric situation just as it is. No other gaskets, washers, insulators, or unions are necessary.